Maize cobs. Photo: A.Conti (FAO)

The feminisation of agriculture and the implications for maize development in China

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Research carried out in the mid-1990s highlighted the rapid socio-economic changes taking place in Chinese agriculture. International and national maize breeders, as well as to local authorities in Southwest China, began to consider the implications of these changes for the conservation, development and use of maize genetic materials.

The most profound changes were found to be in the structure of rural households and farming systems, and related changes in the role of women on the farm. These changes could be characterised as the 'feminisation of agriculture', which in China has multiple causes and effects. As the pressure increases on poor rural households to participate in the cash economy, men are migrating in ever-larger numbers to seek wage employment in cities, local industries, or irrigated agriculture in the lowlands. The bias toward male migration is formed in part by the patriarchal expectations of the family. The husband is supposed to provide for his family economically, guide the household's decisions, and mediate its relations with the outside world. Male migration is also favoured by gender discrimination in the wage labour market, which favours men over women in terms of job opportunities, and pays them higher wages even for the same work.

Women are thus assuming a larger and larger responsibility for meeting the household and food needs of the rural family, while the men seek to make their way in the modern economy, creating a system known as 'two households, one family'. Rural women are also assuming the costs of bringing up children, at a time when China's 'one child' policy has reduced the amount of household and farm labour available to support women's efforts. In the absence of their male relatives, women also are taking on unfamiliar roles in community leadership at a time when the certainties of government provision are giving way to the uncertainties and challenges of the market. The traditional division of labour between farm men and women, captured in the folk slogan 'the men till and the women weave', is surrendering to the new reality of 'women till and the men work in industry'. A survey of farmers has shown that, in selected areas of the three Southwest provinces of Guangxi, Yunan, and Guizhou, women comprise more than 85 per cent of the agricultural labour force. At the same time, the traditional expectation that 'men control the outside world, and women the inner world of the home', is giving way to the reality that women must stretch their 'inner world' to include farming and community responsibilities.

Two of the most difficult challenges that women face in their new roles at the head of farms were shown to be:

1) Accessing viable improved seed from the public sector agencies responsible for seed management, and
2) Maintaining a range of varieties that have the particular characteristics suited to women's preferences and farming conditions.

It was noted that two parallel seed systems were in place: one that is supported by the formal plant breeding and extension

sector, and one that is maintained by poor farm women themselves. The formal sector is focussed on the breeding and dissemination of hybrid, high-yielding varieties, and is driven by the government's push to raise yields per hectare. In favourable conditions, these hybrids provide stable and high yields. However, many of the formal sector's hybrid products were the result of single crosses and lacked the buffering capacity to withstand environmental shocks or to sustain yields in the face of production constraints. In most smallholder subsistence farming areas in Southwest China, the conditions are not at all favourable, and women farmers also experience great difficulties in getting access to hybrid seed. Therefore, they rely upon exchanging the seed from their own harvests amongst themselves and on their indigenous maize breeding practices.

The formal maize breeding and seed supply system before the new seed law

From women farmers' point of view, the almost exclusively male networks of influence and communication in the formal system, which persisted up to the end of 2000, were impossible to penetrate. Women's specific needs, skills, and knowledge were largely ignored. The primary stakeholder in the formal plant breeding process was the Ministry of Agriculture. The Ministry in turn was linked to public service extension agents, so-called 'leading' farmers, government plant breeders and government-controlled seed companies. At the same time, the government's policy of increasing yields through the development and release of hybrids, failed to deliver products that were adapted to the real farming conditions in the smallholder sector.

There were also institutional problems. The breeders tended to blame the extension workers for not communicating the advantages of the modern varieties (MVs) strongly enough and hence not getting them into the hands of sufficient numbers of farmers. The extension workers blamed the farmers for the poor adoption of MVs in more marginal farming areas. Further, since extensionists working in these areas communicated almost exclusively with the minority population of male farmers, they provided distorted feedback to higher authorities regarding the changes taking place in the structure of farming and regarding farmers' needs. In addition, local governments, Ministry officials and seed companies were rewarded on the basis of the number of new hybrid seed varieties released and planted, which biased the formal system toward agricultural areas that were more favourable for the production of released varieties. Also around this time, some official voices began to express concern about the loss of biodiversity in the more favoured areas where the more genetically uniform MVs were displacing farmers' own varieties.

The tensions created by divergent interests, communication blocks and deteriorating institutional relations between the central and local authorities, began to threaten the continued functioning of the formal seed system. At the same time, the political authorities were concerned that millions of poor farmers remained beyond the reach of the formal system and at risk of hunger, while the scientific capacities of the formal system did not seem to be able to reconcile production and conservation goals.

The new Seed Law: opening to innovation

Toward the end of the 1990s, the government began moving to ease the situation by liberalising and privatising certain roles and functions. The People's Congress approved a new Seed Law that became effective December 1, 2000. It allowed the establishment of pilot schemes in order to test local options for a more effective seed system that might reconcile production and conservation goals, and to test ways to bring the formal seed system and poor farmers' seed systems into a mutually supportive relationship.

The opportunities that the new law opened up for local initiative, and the entry of new participants into seed production and exchange, can be illustrated by reference to developments in the state of Guangxi. Guangxi Maize Research Institute (GRMI) had formerly exercised a monopoly on maize seed production in the state. Under the new Seed Law, it was able, without reference to any other authority, to sign contracts with a 'seed production base' such as a village or farmers' organisation, for the production of new planting seed. The conditions of such contracts are that the seed production base must be ready and able to multiply the seed that GMRI develops, and to sell the seed harvest back to the GMRI for distribution to other areas. The villagers or farmers benefit by receiving twice the normal price for the new seed, in comparison with sales of unimproved maize seed to the government.

However, since the incentive price for maize seed remains lower than the market price, new tensions have developed between the GMRI and its suppliers. Meanwhile, since all of the early contracts were issued to 'seed production bases' controlled by men, and to units in the somewhat more favoured areas, at first poor women farmers continued to be excluded.

Women farmers as expert maize breeders

In the case study village of Wenteng, women farmers definitely preferred open pollinated varieties (OPVs) to hybrid varieties, for a number of reasons:

- The seeds can be saved and used again the following year, whereas hybrids lose their vigour after one cropping cycle;
- Farmers can manipulate the genetic material themselves to produce varieties that have desired characteristics related, for example, to yield, stress resistance, taste, storage, and cooking qualities, and to the intensity of crop management;
- OPVs offer the potential for continuing evolution at local level. The 1998 CIMMYT Impact Study was one of the first to document in detail the practices by which women acquired, maintained, and refreshed their preferred varieties through OPV hybridisation.
- OPVs can be crossed with materials brought into the farming system from elsewhere, including those obtained through the formal seed system. The word 'creolisation' is used in this context to refer to the processes by which farmers maintain and improve introduced cultivars.

Women who are known in the village to be expert maize breeders skilfully control the breeding process, from field design to seed selection through to pollination. The women claim that they have maintained their landraces (traditional varieties) through generations by separating the planting of landraces in space and time. The seed that is destined for the following year's planting is harvested, cultivar by cultivar, in a three-step process. The first step is to select the best plants from the middle of the field, that is, healthy, vigorous plants with big maize ears. Step two is to select the best ears based on cob size, length, and the number of seed rows. Step three is to select the best grains from the middle portion of each ear, based on kernel size, shape, quality, and colour.

The process of collaboration

Since the beginning of 2000, a Participatory Plant Breeding (PPB) project has been implemented in Guangxi province by the Center of China Agricultural Policy. The general goal of the project is to enhance the linkages and collaboration between the formal and farmers' systems. PPB and PVS (Participatory variety selection) field trials have been used as a platform for interaction and collaboration between the main stakeholders, i.e. women and men farmers, extensionists and breeders. Six Farmer Plant Breeding Villages were selected in the trial area to represent farmers' seed systems. They were selected on the basis of the previous research and through an analyses of local stakeholders, in order to represent a range of agro-ecosystems and socio-economic conditions, as well as a range of potential opportunities for institutional collaboration with women farmer groups.

Women farmers taking notes in a maize field. Photo: Yiching Song

In the beginning, it was something of a surprise to the scientists and extension workers to discover that men and women, the poorer and better off farmers, or farmers in different farming areas, can make different choices when selecting the varieties, and varietal characteristics that they prefer. Today, these actors are together learning, among other things:

- how to characterise the goals and needs of different types of farmers and of professional plant breeders, as well as the socio-economic environments in which maize is grown;
- male and female farmers' preferences, their indigenous practices and knowledge of plant breeding, seed selection and landrace maintenance; and
- to identify the genetic importance of existing landraces and other creolised local varieties.

The scientists are also trying to understand how farmers have used the genetic material introduced by the formal seed system to create creolised local varieties.

In the process, the male extension workers and scientists are beginning to recognise how women's preferences are linked to their roles in the household. For example, women consistently give a higher rating to 'cooking quality', and to their need to ensure food security even if planting seed cannot be purchased from the market. In contrast, men tend to give higher preference to characteristics that match the demands of the market, such as ability to yield well when grown together with other high value crops such as sweet potato. They are also realising that there are marked differences in the number and type of selection criteria that professional plant breeders consider important, compared to farmers. For example, six men and ten women farmers, three men and four women extension workers, and six men and two women formal plant breeders together examined maize trials during a field day held in June, 2001. The farmers mostly preferred improved varieties of established landraces and creolised populations over the 'superior' hybrid preferred by the formal breeders. The formal breeders assessed a variety almost exclusively in terms of yield and its value in the breeding programme, whereas farmers were also interested in a variety's performance during drought, or its ability to perform well even if fertiliser was not used, whether or not seed could be saved for the next year's planting, or the plant's shape, grain colour, and cooking quality.

In addition to the differences in the selections made by men and women farmers, the farmers from different villages also made different selections, reflecting the distinct climatic and other conditions of each village.

Conclusion

In all, the partners who work in the formal organisations are recognising just how heterogeneous farmers' needs and opportunities are, and that a 'one size fits all' approach will not assist China to develop its agriculture as efficiently and as productively as the authorities would like. Since the numbers of farmers and the areas to be covered are huge, this in turn is forcing an acceptance of a greater role for local organisations controlled by farmers and villagers themselves, as effective counterparts to the formal plant breeding and seed dissemination system.

The collaboration is leading to changes in the ways that plant breeders and extension workers think about their work and behave towards women and men farmers. Over time, the knowledge, skills, and attitudes of the breeders and extensionists, on the one hand, and the farmers, on the other, are drawing closer together, which strengthens all participants. ■

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